

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



2521  
. A75465

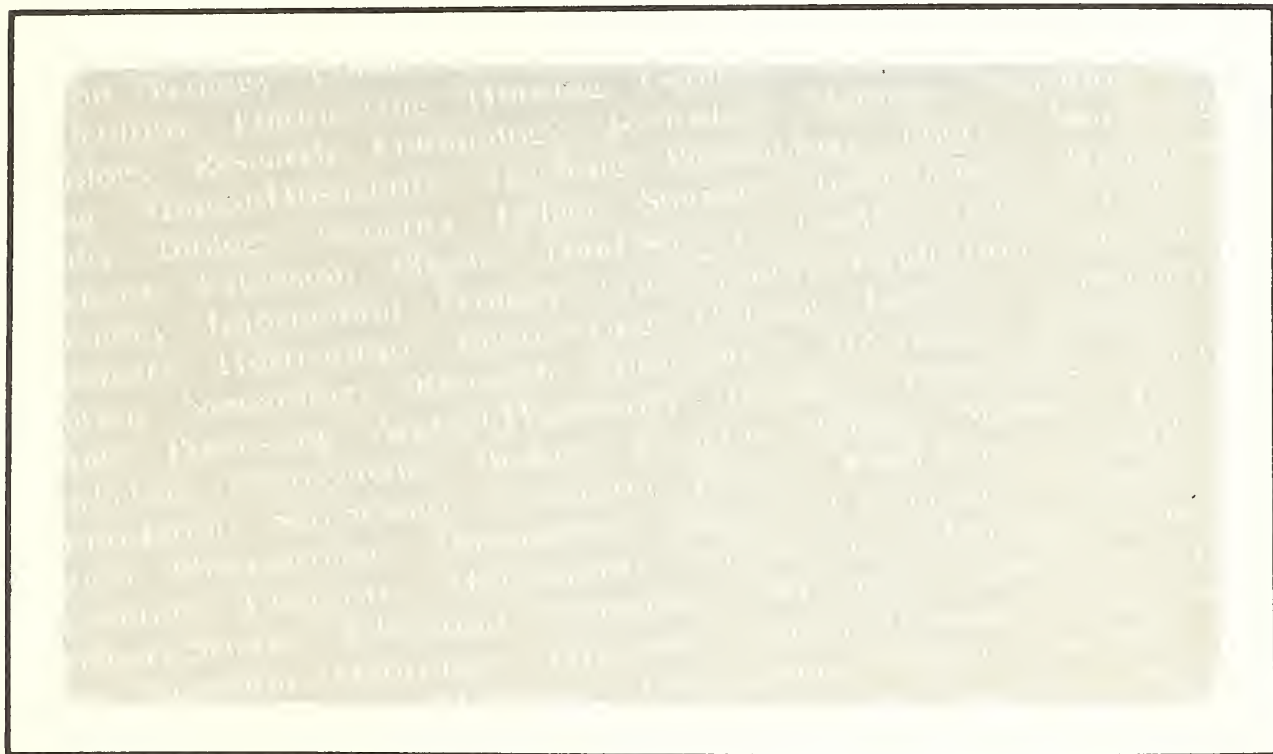
STA

ISSN 0193-3779

copy 2

# Catalog of the Tobacco Introductions in the U.S. Department of Agriculture's Tobacco Germplasm Collection (*Nicotiana tabacum*)

## Supplement 1. Alkaloid Content of the Cured Leaf



U.S. Department of Agriculture  
Agricultural Research Service

Agricultural Reviews and Manuals • ARM-S-27 (Supplement 1) / September 1983

Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

This publication is available from the Tobacco Research Laboratory, Route 2, Box 16G, Oxford, N.C. 27565.

Seed of the accessions listed in this catalog are available to plant breeders, geneticists, and other researchers in tobacco and other plants; to experiment stations; and to public and private research organizations for research and breeding purposes. Shipments will be limited to 0.2 gram, unless specific requirements are stated for a larger amount. Seed are not available in bulk quantities for commercial planting. Order by TI number from the Tobacco Research Laboratory at the address above.

Agricultural Research Service, Agricultural Reviews and Manuals, Southern Series, No. 27 (Supplement 1), September 1983.

---

Published by Agricultural Research Service (Southern Region), U.S. Department of Agriculture, P.O. Box 53326, New Orleans, La. 70153.

## CONTENTS

	Page
Abstract .....	1
Introduction .....	1
Materials and methods .....	2
References .....	3
Major alkaloids in the tobacco introductions .....	4

## ILLUSTRATION

Fig.

1. Chemical structure of the major tobacco alkaloids .....	2
------------------------------------------------------------	---

## TABLE

1. Mean nicotine content and overall ranking of tobacco cultivars used as internal standards, 1978 and 1979 .....	2
-------------------------------------------------------------------------------------------------------------------	---



# Catalog of the Tobacco Introductions in the U.S. Department of Agriculture's Tobacco Germplasm Collection (*Nicotiana tabacum*)

## Supplement 1. Alkaloid Content of the Cured Leaf

By Verne A. Sisson<sup>1</sup> and James A. Saunders<sup>2</sup>

### A B S T R A C T

This supplement gives the content of nicotine, nornicotine, anabasine, and anatabine in the cured leaf of 1,105 *Nicotiana tabacum* L. accessions in the collection. An automated high-pressure liquid chromatography procedure was used for alkaloid analysis. Seed of the accessions are available in limited quantities for research and breeding. Index terms: alkaloids, anabasine, anatabine, catalogs, germplasm collections, *Nicotiana tabacum* L., nicotine, nornicotine, tobacco, tobacco collections, tobacco introductions.

### I N T R O D U C T I O N

The Agricultural Research Service of the U.S. Department of Agriculture maintains one of the world's largest collections of tobacco germplasm. The *Nicotiana tabacum* L. entries in the collection are designated as tobacco introductions (TI's). The assigned TI numbers at the time this study was conducted exceeded 1,620, but elimination of duplicate accessions and loss of a number of others have reduced the actual number of TI's to slightly over 1,100.

The geographic origin and agronomic characteristics of the TI's were given in the first issue of this catalog (Chaplin et al. 1982). This supple-

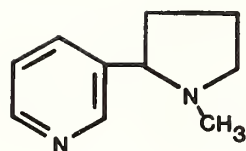
ment gives the content of the single most important chemical components in tobacco leaf and smoke, the alkaloids, which are often associated with both consumer acceptance and the health-related problems of smoking. Numerous alkaloids have been identified in tobacco, but the main ones are nicotine, nornicotine, anabasine, and anatabine (fig. 1). Nicotine and nornicotine are by far the most abundant alkaloids in most tobacco leaf tissue (Sisson and Saunders 1982). Anabasine and anatabine, although easily identified by the techniques used in this study, were often absent or present in relatively small quantities. While alkaloid production is primarily under genetic control (Legg et al. 1969), the level of alkaloids in the tobacco leaf is also influenced by environmental conditions and by cultural and curing practices. The values reported herein may not represent the levels that could be phenotypically expressed by each TI; however, the relative proportion of alkaloids among TI's is assumed to be constant throughout the diversity of the tobacco types, based on the generally uniform ranking of the internal standards used in

<sup>1</sup>Research geneticist, Tobacco Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Oxford, N.C. 27565.

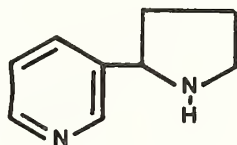
<sup>2</sup>Research biochemist, Tobacco Laboratory, Plant Genetics and Germplasm Institute, Beltsville Agricultural Research Center, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md. 20705.

Table 1.—Mean nicotine content and overall ranking (in parentheses) of tobacco cultivars used as internal standards, 1978 and 1979

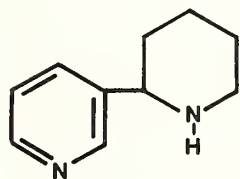
Cultivar	Class	Mean nicotine content (mg/g, dry weight)	
		1978	1979
Madole .....	Dark air-cured .....	32.6 (1)	22.0 (1)
Kavala .....	Turkish .....	26.5 (2)	18.3 (3)
Burley 21 .....	Burley .....	20.0 (8)	19.9 (2)
Pennbel 69 .....	Cigar filler .....	22.1 (3)	15.4 (4)
CCC-L .....	Cigar wrapper .....	21.4 (5)	13.5 (6)
Hav 503 .....	Cigar binder .....	19.9 (9)	12.5 (7)
NC 2326 .....	Flue-cured .....	21.2 (6)	14.7 (5)
NC 95 .....	Flue-cured .....	21.6 (4)	9.6 (9)
Wilson .....	Maryland .....	17.9 (10)	12.3 (8)
Maryland 609 .....	Maryland .....	20.3 (7)	9.6 (10)
Mean .....		22.4	14.8



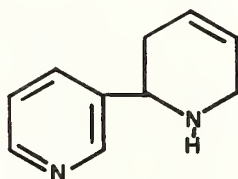
NICOTINE



NORNICOTINE



ANABASINE



ANATABINE

FIGURE 1.—Chemical structure of the major tobacco alkaloids.

this study (table 1) and on the inheritance of alkaloids in tobacco (Mann et al. 1975).

## MATERIALS AND METHODS

One thousand one hundred and eight TI's were grown in single plots of four plants each in the field at the Beltsville (Md.) Agricultural Re-

search Center in 1978. Four randomized blocks of 10 commercial cultivars representing various tobacco types were included in the study as internal standards for comparison of alkaloid levels (table 1). Culturing and curing were uniform for all entries, and normal cultural practices for the Maryland tobacco production area were followed. As each plot flowered, it was topped and hand-suckered. Two to three weeks after topping, all the leaves from three plants in each plot were primed, bulked, tied on sticks, and air-cured. When curing was complete, the midribs were removed and the leaf laminae conditioned at 60% relative humidity and 20° C before being ground through a 2-mm-mesh screen in a Wiley mill. The ground samples were stored at room temperature until analyzed. About 200 entries were lost in the field in 1978 as a result of rain and flooding. These entries and the standards were regrown in the same field the following year, and samples were prepared as described.

The procedure for alkaloid quantitation, reported by Saunders and Blume (1981), used high-pressure liquid chromatography (HPLC). Uniform 0.5-gram (dry weight) lots of the milled samples were extracted with a 25-mM solution of sodium phosphate buffer (pH 7.8). The extract was filtered, diluted tenfold with water, and filtered through a 0.45- $\mu$ m membrane filter before injection into the HPLC system. The tobacco alkaloids were quantitatively separated on a Waters microBondapak C<sub>18</sub> reverse-phase column



eluted at a flow rate of 0.5 ml/min with an isocratic mobile phase of 40% (vol./vol.) methanol containing 0.2% (vol./vol.) phosphoric acid buffered to pH 7.25 with triethylamine. Quantitation of nicotine, nor nicotine, anabasine, and anatabine was determined at 254 nm and the peaks integrated on a Waters 730 Data Module. As little as 50 ng of each of the individual alkaloids could be reliably detected in the samples analyzed by this procedure. "Total alkaloids" was computed by summing the values for the four individual alkaloids. All determinations were made from duplicate injections and comparisons with authentic standards of the alkaloids run intermittently with the unknown samples. In all, data are given for 1,105 of the 1,108 entries.

## REFERENCES

- Chaplin, James F.; Stavely, J. R.; Litton, C. C.; Pittrelli, G. W.; and West, W. H., Jr.  
 1982. Catalog of the tobacco introductions in the U.S. Department of Agriculture's tobacco germplasm collection (*Nicotiana tabacum*). U.S. Agric. Res. Serv. Agric. Rev. Man. South. Ser. (ISSN 0193-3779), No. 27, 48 pp.
- Legg, P.; Chaplin, J. F.; and Collins, G. B.  
 1969. Inheritance of percent total alkaloids in *Nicotiana tabacum* L. J. Hered. 60: 213-217.
- Mann, T. J.; Matzinger, D. F.; and Wernsman, E. A.  
 1975. Genetic control of tobacco constituents. Tob. Res. 1: 1-12.
- Saunders, J. A., and Blume, D. E.  
 1981. Quantitation of major tobacco alkaloids by high performance liquid chromatography. J. Chromatogr. 205: 147-154.
- Sisson, V. A., and Saunders, J. A.  
 1982. Alkaloid composition of the USDA tobacco (*Nicotiana tabacum* L.) introduction collection. Tob. Sci. 26: 117-120.

# MAJOR ALKALOIDS IN THE TOBACCO INTRODUCTIONS

TI's marked with \* were grown in 1979; all others were grown in 1978.

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
4	27.8	27.1	0.2	0.3	0.2
7	26.4	24.6	1.8	.0	.0
11	46.5	42.9	1.1	1.5	1.0
14	16.4	16.4	.0	.0	.0
25	19.6	19.1	.2	.0	.3
36	42.1	39.1	2.2	.0	.8
39	40.8	37.9	2.2	.0	.7
51	24.7	24.4	.0	.0	.3
52*	2.3	1.9	.4	.0	.0
57*	15.0	13.9	.8	.0	.3
58	16.3	16.2	.0	.0	.1
59	42.0	40.4	1.2	.0	.4
60	44.0	41.2	2.3	.0	.5
61	17.2	1.3	15.9	.0	.0
62	53.7	52.7	.6	.0	.4
66*	21.2	20.2	1.0	.0	.0
68	30.9	30.2	.6	.0	.1
69	25.3	23.8	1.1	.0	.4
70	34.2	33.7	.5	.0	.0
72	41.6	36.0	4.7	.0	.9
73	22.1	21.4	.6	.0	.1
74	19.3	19.3	.0	.0	.0
75*	25.9	24.9	.5	.0	.5
77	14.3	13.4	.7	.0	.2
78*	29.6	29.6	.0	.0	.0
79	40.3	39.1	.5	.0	.7
80	54.7	49.7	4.2	.0	.8
81	46.9	42.7	3.4	.0	.8
82	39.6	39.0	.2	.0	.4
83	28.6	28.1	.0	.0	.5
84	22.2	19.3	2.1	.3	.5
85	21.4	21.1	.2	.0	.1
86	7.0	6.8	.0	.2	.0
87	29.9	23.2	6.7	.0	.0
88	23.9	23.7	.2	.0	.0
89*	17.1	16.1	.7	.0	.3
90	16.6	15.4	1.0	.2	.0
92	26.0	24.6	1.1	.2	.1
93	35.8	35.6	.1	.1	.0
94	20.6	20.2	.0	.2	.2
95	6.4	6.3	.0	.1	.0
96*	11.0	9.9	.9	.0	.2

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabesine	Anatabine
97	45.9	44.9	0.6	0.0	0.4
98	42.7	41.5	.9	.0	.3
101	35.0	33.8	.8	.0	.4
102	15.4	10.2	5.2	.0	.0
103	41.9	41.3	.4	.0	.2
104	16.3	7.7	8.3	.0	.3
105	14.6	14.6	.0	.0	.0
106	33.8	31.3	2.2	.0	.3
107	25.5	17.0	8.0	.0	.5
108	19.3	19.3	.0	.0	.0
109	20.0	16.9	2.8	.0	.3
111	21.3	21.2	.0	.0	.1
112	14.4	14.2	.2	.0	.0
113	38.4	32.8	2.3	3.0	.3
115	27.3	27.3	.0	.0	.0
116	14.1	12.6	1.3	.0	.2
117	32.1	31.7	.2	.1	.1
119	23.8	23.8	.0	.0	.0
122	39.0	38.0	.5	.1	.4
123	37.2	31.2	5.2	.0	.8
124	36.2	35.0	.5	.0	.7
125	54.9	47.0	3.9	3.3	.7
126	39.9	39.3	.1	.0	.5
128	14.2	13.7	.1	.0	.4
129	17.4	16.9	.3	.2	.0
130	24.8	24.7	.0	.0	.1
131	26.7	25.8	.5	.0	.4
132*	19.6	18.3	1.2	.0	.1
133	35.0	31.5	2.2	.4	.9
134	37.9	33.8	1.2	2.1	.8
135	52.1	46.0	2.9	2.3	.9
136	38.8	34.2	2.1	2.0	.5
138	35.7	32.1	1.7	1.8	.1
139*	16.8	16.6	.2	.0	.0
141	20.7	20.6	.0	.0	.1
143*	26.5	25.9	.6	.0	.0
144*	22.1	21.3	.8	.0	.0
148	30.3	26.5	3.4	.0	.4
149*	31.8	30.2	1.3	.0	.3
150*	28.6	28.3	.0	.0	.3
151*	5.3	5.3	.0	.0	.0
152	38.8	38.8	.0	.0	.0
153	21.4	20.7	.5	.0	.2
154	44.3	44.1	.0	.0	.2
156	30.7	30.4	.0	.0	.3
157	33.5	33.1	.0	.0	.4

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
158	24.1	23.9	0.2	0.0	0.0
160*	31.3	23.7	7.6	.0	.0
160C*	34.7	34.0	.7	.0	.0
161	49.7	49.1	.3	.0	.3
161B*	25.2	25.2	.0	.0	.0
162	19.5	19.5	.0	.0	.0
163	34.9	34.0	.5	.0	.4
164	50.9	49.1	1.6	.0	.2
165	41.8	41.0	.3	.1	.4
166*	26.0	23.3	2.7	.0	.0
167	53.6	53.4	.0	.0	.2
168	40.1	39.5	.2	.1	.3
169	32.6	32.3	.0	.0	.3
170	32.2	31.5	.3	.1	.3
171	18.7	18.1	.5	.0	.1
172	16.3	16.0	.1	.0	.2
173*	19.6	19.0	.6	.0	.0
174	29.2	29.0	.0	.0	.2
177	36.7	36.3	.3	.0	.1
178	9.1	8.7	.3	.0	.1
179*	4.0	3.7	.3	.0	.0
180	39.0	37.6	.8	.0	.6
181	10.1	9.0	.8	.0	.3
182	29.4	27.1	.9	.0	1.4
183	29.3	28.6	.7	.0	.0
184	49.8	43.8	2.5	.0	3.5
185*	22.3	21.3	1.0	.0	.0
186*	35.2	34.0	.6	.0	.6
187*	42.4	40.9	.8	.0	.7
188*	17.8	17.4	.2	.0	.2
189*	20.7	20.1	.3	.0	.3
191	7.4	7.2	.0	.0	.2
192	23.4	23.2	.0	.0	.2
193	21.5	20.4	.3	.0	.8
194	46.0	44.7	.7	.0	.6
195	5.3	5.2	.1	.0	.0
196	15.1	14.5	.4	.0	.2
197	23.9	23.2	.5	.0	.2
198	25.0	25.0	.0	.0	.0
202	38.3	36.3	1.5	.0	.5
203	20.3	3.0	17.0	.0	.3
204	30.2	8.6	21.3	.0	.3
205	50.9	49.8	.6	.0	.5
206	44.6	43.7	.4	.0	.5
207*	33.8	33.3	.0	.0	.5
208	21.2	20.8	.3	.0	.1
209	39.1	38.6	.2	.0	.3

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
211	25.6	25.2	0.2	0.1	0.1
212	27.0	26.8	.0	.0	.2
213	31.7	31.2	.2	.0	.3
214	48.8	47.8	.4	.1	.5
215	49.4	48.1	.7	.0	.6
216	60.3	59.2	.6	.1	.4
217	38.3	37.0	.4	.2	.7
218	31.3	30.6	.2	.0	.5
219	27.4	25.2	2.1	.0	.1
220	23.5	23.5	.0	.0	.0
221	31.2	30.7	.2	.0	.3
222	14.1	14.1	.0	.0	.0
223	40.6	39.8	.5	.0	.3
224	33.3	30.8	1.8	.0	.7
225	27.5	27.0	.4	.0	.1
226	20.2	11.7	7.6	.0	.9
227	12.9	1.2	11.7	.0	.0
228	26.8	3.7	23.1	.0	.0
229	32.5	3.4	28.6	.0	.5
230	18.1	18.1	.0	.0	.0
231	24.2	24.0	.2	.0	.0
232	24.8	24.0	.5	.0	.3
233*	28.6	28.3	.0	.0	.3
234	15.6	15.2	.2	.0	.2
237	42.7	41.3	.6	.0	.8
238	22.6	21.4	1.0	.2	.0
239	26.6	26.5	.0	.0	.1
240	32.4	32.2	.1	.0	.1
241*	23.5	23.0	.5	.0	.0
242	14.7	13.5	.7	.3	.2
243*	31.7	31.5	.0	.1	.1
245	16.9	16.1	.4	.0	.4
246	20.2	19.6	.3	.0	.3
247	22.4	12.9	9.2	.0	.3
248	22.0	21.2	.3	.0	.5
249*	12.3	11.5	.8	.0	.0
250	15.6	15.1	.4	.0	.1
251	17.9	17.7	.0	.0	.2
252	13.8	13.3	.4	.0	.1
254	27.7	27.4	.3	.0	.0
255	5.9	5.9	.0	.0	.0
256	19.5	18.9	.1	.1	.4
257	9.3	9.3	.0	.0	.0
258	15.4	1.6	12.3	.0	1.5
259	9.4	8.9	.2	.0	.3
260	9.6	9.6	.0	.0	.0
261	21.1	18.2	2.1	.2	.6

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
262	26.2	24.5	1.2	0.0	0.5
263	22.4	21.8	.4	.0	.2
264*	14.4	13.9	.5	.0	.0
265	13.8	13.2	.1	.2	.3
266	31.3	14.3	16.2	.1	.7
267	35.4	34.7	.5	.0	.2
268	13.4	13.4	.0	.0	.0
269	25.1	24.6	.4	.0	.1
270	34.8	25.8	8.7	.0	.3
271	26.6	11.7	14.9	.0	.0
272*	21.7	21.7	.0	.0	.0
273*	19.3	18.8	.3	.0	.2
275*	28.2	27.6	.0	.0	.6
276*	27.3	27.1	.0	.0	.2
277	20.9	20.1	.5	.1	.2
278	41.8	41.3	.2	.1	.2
279	36.8	13.4	22.8	.0	.6
281	46.5	45.8	.3	.1	.3
282	36.6	36.1	.0	.2	.3
283	42.1	41.5	.2	.1	.3
284*	31.8	31.5	.0	.0	.3
285	29.5	29.0	.1	.3	.1
286	30.5	30.0	.3	.0	.2
287	46.0	45.1	.6	.0	.3
288	27.8	27.3	.4	.0	.1
289	43.4	41.8	1.2	.0	.4
290	30.0	29.6	.2	.0	.2
291	45.6	1.7	42.7	.7	.5
292	18.1	18.0	.1	.0	.0
293	33.5	32.9	.2	.1	.3
295	22.6	22.6	.0	.0	.0
296	29.6	29.1	.2	.0	.3
297	18.8	18.6	.2	.0	.0
301	15.2	15.2	.0	.0	.0
302*	31.3	26.1	4.3	.0	.9
303	38.0	37.0	.5	.1	.4
304	26.3	25.6	.5	.0	.2
305	27.3	26.7	.2	.0	.4
306*	13.6	12.2	1.4	.0	.0
307*	32.6	32.3	.0	.0	.3
308	37.6	36.6	.6	.0	.4
309*	17.1	17.1	.0	.0	.0
310	26.3	25.8	.2	.0	.3
311*	3.9	3.6	.0	.3	3.9
312*	16.6	16.6	.0	.0	.0
313	1.8	1.8	.0	.0	.0
317	16.5	16.1	.2	.0	.2

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
318	20.4	20.4	0.0	0.0	0.0
319	34.6	30.9	3.7	.0	.0
321	21.9	21.8	.0	.0	.1
322	20.3	18.2	2.0	.0	.1
323	9.6	9.6	.0	.0	.0
324	24.1	23.8	.2	.0	.1
326	27.4	10.6	16.4	.1	.3
327	28.2	20.9	7.0	.0	.3
328	33.7	33.1	.5	.0	.1
330	4.7	4.6	.0	.0	.1
331*	39.4	38.2	.5	.0	.7
332	31.4	30.7	.4	.0	.3
333	27.5	27.4	.1	.0	.0
335	23.3	22.9	.0	.0	.4
337	23.9	23.5	.4	.0	.0
338	27.0	20.8	6.2	.0	.0
340*	21.7	21.5	.0	.0	.2
341*	10.6	10.6	.0	.0	.0
343*	10.4	10.4	.0	.0	.0
344*	14.9	14.7	.0	.0	.2
346	19.3	19.1	.2	.0	.0
348	10.8	10.5	.3	.0	.0
349	13.3	13.1	.2	.0	.0
350	14.0	14.0	.0	.0	.0
351	27.0	26.7	.0	.0	.3
355	34.5	34.3	.0	.0	.2
363	20.8	18.5	2.3	.0	.0
365	27.1	25.5	1.1	.0	.5
366*	24.6	24.3	.0	.0	.3
368*	12.6	12.5	.0	.0	.1
370	18.3	17.6	.2	.2	.3
371	24.2	24.1	.0	.1	.0
372	43.0	39.2	3.1	.0	.7
373	25.7	25.4	.2	.0	.1
375	46.2	45.2	.6	.0	.4
378	27.1	26.4	.4	.0	.3
379*	26.6	26.3	.0	.0	.3
380	26.6	26.2	.3	.1	.0
381	9.5	3.0	6.5	.0	.0
382	15.3	15.3	.0	.0	.0
383	20.8	20.7	.0	.0	.1
384	7.1	7.1	.0	.0	.0
385	5.3	5.3	.0	.0	.0
388	25.3	24.7	.3	.0	.3
389	26.0	13.8	11.8	.0	.4
390	24.7	23.5	.8	.0	.4
391	27.5	27.0	.1	.0	.4



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
392	35.6	34.7	0.3	0.0	0.6
394	35.9	35.9	.0	.0	.0
395	11.8	11.7	.0	.1	.0
396	19.3	16.7	2.4	.2	.0
397	19.1	3.0	15.2	.0	.9
398	32.9	31.1	1.2	.1	.5
399	34.8	32.6	1.5	.0	.7
400	36.4	33.4	1.8	.4	.8
401	65.5	58.0	6.1	.2	1.2
402	36.6	27.6	8.3	.0	.7
403	26.7	25.2	1.1	.0	.4
404	32.3	31.5	.6	.0	.2
405	17.4	16.4	.6	.0	.4
406	37.4	37.2	.0	.0	.2
407	4.1	4.1	.0	.0	.0
409	25.7	25.6	.1	.0	.0
410	18.4	18.0	.3	.0	.1
411	8.7	8.4	.0	.0	.3
412*	5.7	5.5	.0	.0	.2
413	27.6	27.4	.0	.0	.2
415	31.3	30.7	.3	.0	.3
419*	33.4	33.0	.1	.0	.3
420	30.0	28.0	1.9	.0	.1
421	17.2	17.2	.0	.0	.0
422	35.0	34.4	.5	.0	.1
423*	41.8	41.1	.0	.0	.7
424*	23.7	23.7	.0	.0	.0
425*	38.6	33.7	4.3	.0	.6
426	28.3	23.3	4.6	.0	.4
427	14.6	14.1	.5	.0	.0
428	36.1	35.3	.5	.0	.3
429*	28.8	28.8	.0	.0	.0
431	25.0	24.8	.0	.0	.2
432	18.8	18.8	.0	.0	.0
433	34.2	33.4	.4	.0	.4
436	20.9	20.4	.4	.0	.1
437	7.4	7.2	.0	.0	.2
438	6.4	6.4	.0	.0	.0
439	11.2	10.9	.0	.0	.3
444	21.8	21.6	.1	.0	.1
445*	9.2	9.2	.0	.0	.0
446*	23.8	23.5	.0	.0	.3
447	9.0	9.0	.0	.0	.0
448	10.6	5.9	4.5	.1	.1
448A	7.7	3.2	4.4	.0	.1
449	8.9	5.2	3.7	.0	.0
450	13.7	13.7	.0	.0	.0



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
451	43.8	42.4	0.8	0.0	0.6
453	27.6	26.4	.7	.4	.1
454*	11.1	9.6	1.4	.0	.1
455	40.8	40.2	.5	.1	.0
456*	7.2	7.0	.0	.2	.0
459	25.6	24.5	.2	.0	.9
460	33.1	32.3	.5	.0	.3
461	44.1	43.1	.6	.0	.4
462	46.3	44.1	1.8	.1	.3
463	25.2	24.9	.2	.0	.1
464	64.9	64.4	.3	.0	.2
465	13.3	8.5	4.6	.0	.2
467	26.8	25.0	1.3	.0	.5
468	24.9	24.5	.2	.0	.2
469	36.3	2.7	33.3	.0	.3
470	25.5	24.8	.4	.0	.3
471	26.6	26.0	.2	.0	.4
472	33.8	33.2	.5	.1	.0
473	20.4	19.8	.3	.0	.3
474	22.8	22.0	.2	.0	.6
475	27.0	26.1	.7	.0	.2
476	17.4	17.4	.0	.0	.0
478	47.5	46.7	.5	.0	.3
479	27.6	27.2	.1	.0	.3
480	12.2	11.2	.8	.2	.0
481	17.8	17.6	.2	.0	.0
482	17.4	8.5	8.9	.0	.0
483	40.0	39.2	.5	.2	.1
484	18.4	17.2	1.0	.2	.0
485	51.3	50.2	.4	.5	.2
486	21.4	20.1	1.1	.2	.0
487	24.2	22.0	.8	1.3	.1
488	54.3	53.7	.6	.0	.0
489	51.1	49.2	1.2	.7	.0
490	26.4	26.1	.1	.1	.1
491	43.5	41.7	1.1	.0	.7
492	22.2	21.8	.1	.0	.3
493	21.3	20.9	.4	.0	.0
494	22.1	21.2	.2	.3	.4
495	39.5	39.3	.2	.0	.0
496	31.3	29.5	1.8	.0	.0
497	17.3	16.2	.4	.1	.6
498	31.6	29.0	2.5	.0	.1
499	16.8	16.5	.3	.0	.0
500	43.3	1.9	40.9	.0	.5
501	63.8	61.5	1.8	.1	.4
502	20.0	19.3	.1	.2	.4

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
503	24.4	23.6	0.6	0.0	0.2
504	24.3	22.1	1.6	.2	.4
505	24.7	24.1	.3	.1	.2
506	11.1	8.6	2.3	.2	.0
508	4.8	4.8	.0	.0	.0
509	30.3	29.6	.3	.2	.2
510	17.3	17.3	.0	.0	.0
511	11.1	10.5	.6	.0	.0
512	13.7	13.5	.2	.0	.0
514*	23.5	23.5	.0	.0	.0
515*	9.0	9.0	.0	.0	.0
516*	.2	.1	.0	.0	.1
522	12.3	12.1	.2	.0	.0
523	27.0	26.2	.3	.0	.5
524	32.0	30.8	.4	.0	.8
525	24.3	23.4	.3	.0	.6
526	.7	.4	.0	.3	.0
527	5.1	5.1	.0	.0	.0
528	15.5	15.5	.0	.0	.0
530	10.0	10.0	.0	.0	.0
532	20.2	18.5	1.7	.0	.0
533	16.6	16.5	.1	.0	.0
534	10.7	9.4	.9	.4	.0
535	18.6	18.4	.0	.2	.0
536	34.2	31.1	3.1	.0	.0
537	21.4	20.8	.3	.3	.0
538	20.0	18.0	1.6	.4	.0
539*	25.3	24.3	.4	.0	.6
540	25.1	23.4	1.4	.3	.0
541	15.3	13.3	2.0	.0	.0
542	36.8	35.0	1.4	.2	.2
544*	26.2	25.6	.5	.0	.1
546	43.7	35.3	7.8	.0	.6
548	29.2	27.3	1.9	.0	.0
549	20.3	16.6	2.7	.2	.8
550	26.2	25.1	.4	.5	.2
551*	34.0	33.4	.6	.0	.0
553	35.0	4.4	30.0	.1	.5
554	3.1	3.1	.0	.0	.0
556	26.0	25.5	.2	.0	.3
557	25.5	25.0	.4	.0	.1
559*	10.0	9.7	.3	.0	.0
560	10.8	10.8	.0	.0	.0
561	19.3	19.1	.0	.0	.2
562*	11.6	11.6	.0	.0	.0
564	24.0	23.8	.2	.0	.0
565*	28.2	27.9	.0	.0	.3

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
566	34.8	34.2	0.2	0.0	0.4
567	21.2	20.3	.9	.0	.0
568	15.2	13.9	1.3	.0	.0
569	25.5	25.3	.0	.0	.2
570*	27.4	26.6	.4	.0	.4
572	30.1	28.5	.8	.0	.8
573	20.7	20.5	.2	.0	.0
574	13.0	12.6	.2	.2	.0
575	24.3	23.9	.2	.1	.1
576	10.9	10.7	.2	.0	.0
577	28.6	28.5	.0	.0	.1
578	16.3	16.3	.0	.0	.0
579	22.5	16.4	5.3	.0	.8
581	23.6	22.0	1.6	.0	.0
582*	28.9	28.9	.0	.0	.0
583	31.1	30.9	.1	.0	.1
584	23.6	23.4	.1	.0	.1
585	27.5	24.2	2.7	.0	.6
587	28.8	28.2	.2	.1	.3
588	20.3	19.9	.2	.0	.2
589	40.2	37.5	2.7	.0	.0
592	8.0	8.0	.0	.0	.0
593	17.2	17.0	.2	.0	.0
594	37.8	33.8	3.1	.0	.9
595	13.6	12.4	1.2	.0	.0
596	18.9	18.9	.0	.0	.0
597	27.7	27.2	.3	.0	.2
599	21.0	20.7	.2	.1	.0
601*	9.7	9.4	.3	.0	.0
603	41.8	40.7	.6	.0	.5
604	35.1	3.1	31.0	.3	.7
605*	10.3	9.7	.6	.0	.0
606*	4.8	4.8	.0	.0	.0
607	21.9	21.4	.3	.0	.2
612*	19.3	18.0	1.3	.0	.0
613*	27.9	27.4	.4	.0	.1
615	17.1	16.7	.3	.0	.1
617*	15.0	14.2	.0	.0	.8
621	30.7	30.2	.2	.0	.3
626*	32.2	31.5	.4	.0	.3
627*	36.7	36.0	.3	.0	.4
629*	19.8	19.8	.0	.0	.0
630	10.4	10.4	.0	.0	.0
633	28.0	26.8	.9	.0	.3
635	16.9	16.4	.0	.0	.5
641	10.9	10.7	.2	.0	.0
642	26.4	22.8	3.6	.0	.0

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabesine	Anatabine
645	22.5	22.5	0.0	0.0	0.0
646	30.0	29.7	.1	.0	.2
647	23.2	22.9	.1	.0	.2
648	33.3	32.9	.2	.1	.1
650	42.3	41.0	.8	.0	.5
657	17.0	17.0	.0	.0	.0
658	21.6	21.1	.5	.0	.0
659	38.9	37.7	.3	.4	.5
660	23.1	22.7	.2	.0	.2
661	9.8	9.8	.0	.0	.0
662*	19.3	18.9	.4	.0	.0
665*	20.8	20.8	.0	.0	.0
666*	20.8	20.2	.6	.0	.0
668*	25.2	17.7	7.5	.0	.0
672	39.4	38.6	.3	.0	.5
675	23.9	23.7	.0	.0	.2
677	19.5	19.3	.2	.0	.0
683	23.6	23.4	.0	.0	.2
687	15.4	15.4	.0	.0	.0
690	36.2	34.6	1.1	.0	.5
691	21.6	21.6	.0	.0	.0
692	40.8	39.1	1.3	.0	.4
694	14.4	8.7	5.4	.0	.3
698	15.9	12.7	3.2	.0	.0
700	26.4	26.0	.3	.0	.1
703	38.8	37.8	.4	.0	.6
704	18.4	17.2	1.0	.0	.2
705*	27.2	26.6	.3	.2	.1
706	41.6	40.2	1.0	.0	.4
708	23.2	22.0	1.2	.0	.0
710	24.0	23.7	.2	.0	.1
711	16.6	16.5	.1	.0	.0
712	24.4	24.0	.2	.0	.2
716	20.8	20.5	.3	.0	.0
717	34.0	34.0	.0	.0	.0
718	11.5	11.4	.1	.0	.0
719	41.3	40.6	.4	.0	.3
720	47.5	17.3	29.6	.0	.6
721	22.9	22.6	.3	.0	.0
722W	32.4	29.9	2.5	.0	.0
722R	12.8	12.8	.0	.0	.0
727	35.4	34.8	.3	.0	.3
728	10.7	10.2	.4	.0	.1
729	42.9	42.3	.3	.0	.3
730	49.7	48.6	.6	.0	.5
731	46.7	46.5	.2	.0	.0
732R	24.3	24.0	.0	.2	.1

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
732W	36.6	36.4	0.0	0.0	0.2
734	7.8	7.3	.5	.0	.0
735	14.2	14.0	.2	.0	.0
743	26.8	26.5	.3	.0	.0
745	23.2	23.0	.2	.0	.0
746	27.8	27.6	.1	.0	.1
747	24.7	24.3	.2	.0	.2
748	37.8	37.5	.1	.0	.2
750	18.0	17.9	.1	.0	.0
751	26.0	25.3	.2	.1	.4
752	26.1	25.5	.3	.0	.3
758	24.1	23.8	.0	.0	.3
760*	31.0	29.9	.5	.0	.6
761*	31.9	31.5	.0	.0	.4
764*	10.9	10.9	.0	.0	.0
765*	48.2	47.3	.4	.0	.5
767*	16.7	16.0	.0	.0	.7
769	10.2	9.8	.4	.0	.0
770	13.4	2.7	10.7	.0	.0
771	15.9	13.4	2.5	.0	.0
772	16.8	15.7	1.1	.0	.0
776	14.4	14.2	.2	.0	.0
779	24.6	23.5	1.1	.0	.0
780	23.1	3.9	19.2	.0	.0
782*	35.4	34.5	.5	.0	.4
783*	9.5	9.1	.0	.0	.4
784*	38.7	37.1	1.3	.0	.3
785*	8.0	8.0	.0	.0	.0
786*	22.2	17.9	4.3	.0	.0
787	16.9	16.7	.2	.0	.0
788*	30.7	25.2	5.5	.0	.0
789*	31.4	31.4	.0	.0	.0
790	15.2	14.8	.3	.0	.1
792*	19.4	19.4	.0	.0	.0
793	16.1	3.8	12.3	.0	.0
794	12.0	12.0	.0	.0	.0
797	8.9	8.9	.0	.0	.0
799	14.1	13.7	.3	.0	.1
804	23.6	23.5	.1	.0	.0
805	37.7	36.4	.8	.0	.5
806	39.8	38.8	.5	.1	.4
810*	29.2	28.7	.3	.0	.2
813	25.3	23.0	1.6	.1	.6
814	52.1	51.3	.4	.2	.2
817	35.0	33.5	.8	.0	.7
819	22.6	22.4	.2	.0	.0
820	37.5	37.1	.4	.0	.0

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
821	44.8	42.3	0.9	0.5	1.1
822*	8.8	8.8	.0	.0	.0
824*	30.4	25.4	4.8	.0	.2
825	14.1	13.3	.5	.0	.3
826	30.8	28.3	1.1	.0	1.4
828	32.4	28.4	3.2	.0	.8
829	36.4	35.2	.2	.4	.6
832	37.6	34.8	1.9	.1	.8
834	55.5	53.7	1.2	.2	.4
835	54.4	53.6	.7	.0	.1
839*	41.5	41.0	.4	.0	.1
840	47.4	44.4	3.0	.0	.0
841	13.0	11.8	.9	.2	.1
843	45.7	44.0	1.3	.0	.4
844	36.9	36.1	.5	.0	.3
845	48.2	46.1	1.6	.0	.5
848	31.8	31.1	.4	.0	.3
850	21.3	20.9	.3	.0	.1
851	31.5	31.3	.2	.0	.0
852	33.9	32.2	1.5	.0	.2
853	10.4	.2	10.1	.0	.1
854	14.2	6.3	7.7	.0	.2
855	47.9	39.7	7.5	.0	.7
856	25.8	25.4	.2	.1	.1
857	7.3	7.2	.1	.0	.0
859	56.9	56.0	.5	.0	.4
860	19.2	4.1	15.0	.0	.1
861	50.1	49.4	.4	.0	.3
865*	9.2	7.4	1.8	.0	.0
866	22.2	18.1	4.1	.0	.0
868*	22.6	22.2	.4	.0	.0
870	18.7	18.7	.0	.0	.0
872*	14.8	14.5	.0	.0	.3
874*	35.2	33.5	1.1	.0	.6
875	25.8	25.4	.3	.0	.1
877*	4.9	4.0	.1	.0	.8
878*	19.5	19.1	.0	.0	.4
879	25.2	25.1	.0	.0	.1
880	43.9	39.6	3.5	.0	.8
881	8.1	7.7	.4	.0	.0
882	12.7	11.6	1.0	.0	.1
883	39.0	37.4	1.5	.0	.1
888	8.4	3.4	5.0	.0	.0
889	17.7	17.7	.0	.0	.0
890	30.6	30.3	.3	.0	.0
891	10.5	1.4	8.9	.0	.2
892	32.7	31.9	.3	.0	.5

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
893	39.6	36.3	2.9	0.2	0.2
894	34.5	34.1	.2	.0	.2
896	18.5	18.0	.4	.0	.1
899	19.2	18.6	.2	.0	.4
901	55.5	54.6	.5	.0	.4
910	14.1	9.8	4.2	.0	.1
914	19.4	15.7	3.5	.0	.2
916	49.0	48.4	.2	.2	.2
918	11.4	10.7	.7	.0	.0
920	17.2	16.3	.6	.0	.3
922	39.9	38.9	.5	.0	.5
927	50.7	40.9	9.2	.3	.3
929	50.4	47.8	1.0	.1	1.5
931	38.3	36.6	1.2	.1	.4
933	35.6	32.7	2.7	.0	.2
934	42.2	41.1	.6	.2	.3
935	43.1	42.2	.5	.0	.4
936*	19.6	18.1	1.5	.0	.0
937*	33.7	31.9	1.8	.0	.0
940	30.8	30.6	.0	.0	.2
941	15.8	15.0	.7	.0	.1
942	24.6	13.8	9.9	.5	.4
944	45.1	44.5	.4	.0	.2
946	20.0	20.0	.0	.0	.0
947	33.6	32.8	.4	.2	.2
950	10.9	10.8	.0	.0	.1
951	39.6	38.8	.3	.0	.5
953	18.2	18.0	.1	.0	.1
955*	10.4	10.4	.0	.0	.0
956	16.1	15.9	.2	.0	.0
959	59.3	59.0	.0	.1	.2
960	30.9	30.5	.1	.1	.2
964A	30.3	29.8	.1	.0	.4
964B*	8.0	8.0	.0	.0	.0
967*	22.7	22.0	.4	.0	.3
968*	25.0	23.6	1.0	.3	.1
971	28.0	17.9	9.8	.0	.3
973	47.9	45.8	1.6	.2	.3
975	25.3	23.3	1.8	.0	.2
979	45.7	45.0	.3	.0	.4
980	22.3	20.9	1.4	.0	.0
981	41.9	41.3	.5	.0	.1
982	44.7	43.3	1.0	.0	.4
983	36.0	34.8	1.2	.0	.0
984	42.6	41.6	.4	.0	.6
990	45.9	45.7	.2	.0	.0
995	10.7	9.4	1.0	.0	.3



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
998	18.6	18.2	0.3	0.1	0.0
999	41.1	40.4	.4	.0	.3
1004	29.0	28.6	.4	.0	.0
1005	24.8	22.5	2.0	.0	.3
1006	19.8	19.6	.0	.0	.2
1007	21.2	21.2	.0	.0	.0
1008	19.4	19.1	.1	.0	.2
1011	24.7	24.6	.0	.0	.1
1013	58.9	58.1	.6	.0	.2
1014	1.0	.6	.4	.0	.0
1017	21.8	20.3	1.5	.0	.0
1018	19.8	2.1	17.7	.0	.0
1019	18.9	18.7	.1	.1	.0
1022	23.6	18.5	5.0	.0	.1
1024	10.3	10.1	.1	.0	.1
1025	20.4	20.4	.0	.0	.0
1026	23.3	23.3	.0	.0	.0
1028	40.8	40.2	.4	.0	.2
1029	16.4	16.2	.2	.0	.0
1030*	19.0	18.8	.0	.0	.2
1031*	13.8	13.6	.0	.0	.2
1032*	5.7	4.2	1.4	.0	.1
1040	30.4	30.1	.2	.0	.1
1042	28.3	28.2	.0	.0	.1
1043	33.5	32.8	.2	.0	.5
1046	43.9	41.5	1.2	.0	1.2
1048	11.0	10.8	.2	.0	.0
1049	19.0	16.1	2.2	.4	.3
1050*	21.0	21.0	.0	.0	.0
1051	46.9	44.7	1.4	.0	.8
1057	27.8	11.9	15.0	.0	.9
1059	42.8	42.0	.4	.0	.4
1060*	9.5	.3	8.7	.0	.5
1061*	16.1	16.1	.0	.0	.0
1065*	22.4	22.2	.0	.0	.2
1067	27.1	27.1	.0	.0	.0
1068	11.8	11.8	.0	.0	.0
1070	31.1	30.3	.5	.0	.3
1071	42.4	41.1	.6	.0	.7
1073	40.8	39.9	.5	.0	.4
1075B	17.0	17.0	.0	.0	.0
1075G	32.6	6.8	25.4	.0	.4
1076	45.7	44.8	.5	.0	.4
1077	41.4	40.5	.6	.0	.3
1078	33.7	32.2	1.2	.0	.3
1079	27.1	26.9	.2	.0	.0
1080*	14.8	14.8	.0	.0	.0



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1082	18.3	18.3	0.0	0.0	0.0
1083	18.1	18.1	.0	.0	.0
1084*	28.3	27.6	.7	.0	.0
1085	7.5	7.5	.0	.0	.0
1088	36.1	35.3	.4	.0	.4
1089	36.5	36.0	.3	.0	.2
1091	35.7	34.8	.5	.0	.4
1092	27.3	26.8	.0	.0	.5
1093	44.0	42.9	.7	.2	.2
1095	12.9	12.9	.0	.0	.0
1097	30.2	29.8	.2	.0	.2
1098*	23.9	23.5	.2	.0	.2
1099	30.6	29.9	.5	.0	.2
1100	12.6	11.3	1.1	.0	.2
1104	24.9	24.7	.1	.0	.1
1110	22.1	19.5	2.0	.1	.5
1112	15.3	1.2	13.7	.0	.4
1113	46.3	44.4	.9	.0	1.0
1114	41.7	41.1	.5	.0	.1
1117	40.3	35.8	3.6	.0	.9
1118	5.4	5.0	.4	.0	.0
1119*	26.6	26.6	.0	.0	.0
1120	7.0	6.7	.2	.1	.0
1122	13.4	13.3	.1	.0	.0
1123	30.1	28.2	1.2	.2	.5
1124	46.3	44.6	1.4	.0	.3
1125*	27.1	26.8	.2	.0	.1
1126	7.9	5.7	2.1	.0	.1
1127	10.1	9.3	.5	.2	.1
1129*	18.0	17.3	.7	.0	.0
1130	3.5	3.0	.2	.1	.2
1132*	7.1	3.1	4.0	.0	.0
1133	24.6	23.3	.9	.0	.4
1134	40.2	39.2	.6	.0	.4
1136	32.0	31.6	.2	.0	.2
1138	31.4	20.1	10.7	.1	.5
1139	25.4	21.2	4.1	.0	.1
1140	39.4	38.2	.7	.0	.5
1141	20.8	20.1	.5	.0	.2
1143	21.9	21.9	.0	.0	.0
1144	54.9	53.5	1.0	.0	.4
1145	8.8	8.7	.0	.0	.1
1148	30.1	14.4	15.2	.0	.5
1160	24.7	23.4	1.0	.1	.2
1201	19.4	14.6	4.5	.0	.3
1202	33.3	32.7	.3	.1	.2
1203	19.4	18.3	1.1	.0	.0

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1204	24.1	24.0	0.1	0.0	0.0
1205	19.8	19.6	.0	.0	.2
1211*	7.0	7.0	.0	.0	.0
1212*	47.0	46.4	.6	.0	.0
1213	38.6	37.8	.5	.0	.3
1214	23.4	22.8	.2	.0	.4
1215*	14.6	14.6	.0	.0	.0
1216*	27.6	26.2	1.4	.0	.0
1217	21.7	21.2	.2	.0	.3
1218	11.1	11.0	.1	.0	.0
1219	4.7	4.4	.3	.0	.0
1221	16.0	14.1	1.6	.0	.3
1222	19.2	18.9	.2	.1	.0
1223	28.0	27.1	.6	.1	.2
1224	13.3	1.0	11.7	.0	.6
1225	25.3	19.5	5.0	.0	.8
1227	31.3	25.9	5.3	.0	.1
1228	5.9	4.0	1.5	.2	.2
1229	35.0	33.7	1.1	.0	.2
1230	7.1	1.5	5.1	.0	.5
1232*	3.9	3.4	.3	.0	.2
1233	23.1	22.6	.4	.0	.1
1234	12.5	10.9	1.2	.0	.4
1235	17.7	16.6	.8	.0	.3
1236	18.2	16.9	1.1	.0	.2
1237	18.6	17.7	.7	.0	.2
1239	38.9	37.9	.5	.0	.5
1240	41.0	40.8	.2	.0	.0
1241	22.1	21.6	.3	.1	.1
1242	40.7	37.5	2.8	.0	.4
1243	28.3	27.5	.7	.0	.1
1244	27.0	26.4	.5	.0	.1
1245	24.5	23.7	.2	.0	.6
1246	6.7	6.1	.4	.0	.2
1247	34.3	32.5	1.4	.0	.4
1248	38.8	7.2	30.8	.0	.8
1249	52.5	51.0	1.0	.0	.5
1250	11.0	10.9	.1	.0	.0
1251*	34.8	34.6	.0	.0	.2
1252	42.2	41.3	.5	.0	.4
1253*	36.9	35.9	.8	.0	.2
1254	24.6	24.2	.0	.0	.4
1255	25.2	20.7	4.0	.0	.5
1257	52.3	51.5	.4	.0	.4
1259	21.8	21.6	.0	.0	.2
1261	34.0	33.2	.4	.0	.4
1268*	13.9	.0	13.8	.0	.1

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1269*	24.6	23.9	0.5	0.0	0.2
1270	15.1	13.9	1.1	.0	.1
1271	20.9	20.5	.3	.0	.1
1272	24.2	24.0	.2	.0	.0
1274	39.9	39.5	.1	.0	.3
1275*	60.3	58.5	.9	.0	.9
1276	27.0	26.6	.2	.1	.1
1277	27.9	27.9	.0	.0	.0
1278	12.8	11.7	.9	.0	.2
1279*	7.2	7.2	.0	.0	.0
1280	27.4	25.7	1.4	.0	.3
1281*	25.0	24.4	.3	.0	.3
1282	38.5	35.3	2.9	.0	.3
1283	33.1	30.4	2.2	.0	.5
1284	26.3	23.4	2.5	.0	.4
1285	30.4	30.1	.1	.1	.1
1286	10.8	10.3	.4	.0	.1
1287	9.3	9.1	.1	.0	.1
1288	18.4	18.4	.0	.0	.0
1289	32.1	31.8	.0	.0	.3
1290*	16.9	15.2	1.1	.1	.5
1291	26.5	23.8	2.3	.0	.4
1292	22.5	21.9	.4	.0	.2
1293	27.1	25.1	1.8	.0	.2
1294	35.9	35.2	.3	.0	.4
1295	16.2	16.0	.0	.0	.2
1296	19.7	17.5	1.9	.0	.3
1297	7.7	7.2	.3	.0	.2
1298	16.8	16.5	.1	.1	.1
1299	43.3	42.5	.5	.0	.3
1300	36.2	18.0	17.8	.0	.4
1301	31.7	29.8	1.7	.0	.2
1302	23.0	22.0	.9	.0	.1
1303	36.1	35.7	.2	.0	.2
1304	32.1	30.3	1.4	.0	.4
1305	26.8	26.6	.0	.0	.2
1306*	28.5	26.9	1.3	.0	.3
1308	36.8	35.1	1.1	.0	.6
1309	48.2	41.1	6.2	.1	.8
1310	27.8	26.6	1.2	.0	.0
1311*	34.7	33.2	1.0	.0	.5
1312	8.3	2.1	5.7	.0	.5
1313*	27.8	26.8	.7	.0	.3
1315	21.7	21.1	.3	.2	.1
1316	32.9	32.8	.0	.0	.1
1317	9.9	9.4	.2	.2	.1
1318	19.6	16.7	2.3	.5	.1

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabesine	Anatabine
1319	24.2	24.0	0.0	0.0	0.2
1320	22.0	21.6	.1	.2	.1
1321	16.4	15.8	.6	.0	.0
1322	28.1	27.5	.4	.0	.2
1323	40.8	37.6	2.8	.0	.4
1324	17.1	13.3	3.6	.0	.2
1325	28.7	14.3	14.3	.0	.1
1326*	18.0	.4	17.2	.2	.2
1327	13.8	13.5	.2	.1	.0
1329	12.0	11.8	.1	.1	.0
1330	51.9	48.3	3.6	.0	.0
1331	25.7	25.7	.0	.0	.0
1332	17.4	16.8	.3	.2	.1
1333	28.3	21.2	6.9	.0	.2
1334	27.5	27.2	.1	.0	.2
1335	14.0	13.1	.6	.0	.3
1341	30.2	29.8	.0	.0	.4
1342	8.4	8.1	.2	.0	.1
1347	....	....	....	...	...
1348*	16.3	8.7	7.3	.0	.3
1349	29.6	29.1	.3	.0	.2
1350	21.0	21.0	.0	.0	.0
1351	28.8	28.1	.3	.0	.4
1352	9.3	9.3	.0	.0	.0
1353*	28.9	27.9	.5	.0	.5
1354	6.8	6.5	.0	.0	.3
1355*	17.4	16.9	.2	.0	.3
1356	23.6	23.6	.0	.0	.0
1357	20.0	19.8	.0	.0	.2
1358*	26.2	25.8	.2	.0	.2
1359	43.1	42.2	.4	.0	.5
1360	35.1	34.9	.0	.0	.2
1361	37.3	36.0	.9	.0	.4
1362	33.9	32.9	.5	.0	.5
1363	26.5	23.5	2.6	.0	.4
1364	14.3	13.0	1.0	.0	.3
1365*	48.2	22.8	24.8	.0	.6
1366	38.9	38.4	.3	.0	.2
1367	54.7	53.9	.5	.0	.3
1372	32.3	32.0	.0	.0	.3
1373*	21.9	21.3	.3	.1	.2
1374	41.4	40.6	.5	.0	.3
1375	19.3	18.4	.5	.0	.4
1376	34.7	34.1	.3	.2	.1
1377	31.6	31.4	.2	.0	.0
1378	23.7	21.8	1.1	.5	.3
1379	21.1	20.4	.4	.2	.1

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1380	16.3	15.7	0.6	0.0	0.0
1381	29.5	28.8	.5	.0	.2
1382	29.4	28.7	.3	.2	.2
1383	6.1	5.9	.1	.1	.0
1384	22.9	22.6	.2	.1	.0
1385	8.4	8.0	.2	.2	.0
1386	4.7	4.3	.3	.1	.0
1387	11.9	11.6	.2	.1	.0
1388	22.7	22.7	.0	.0	.0
1389	8.3	8.0	.1	.2	.0
1390	13.4	12.5	.7	.0	.2
1391	26.9	24.8	1.7	.0	.4
1392	31.7	31.3	.2	.0	.2
1393*	18.0	17.7	.0	.0	.3
1394	15.8	15.4	.3	.0	.1
1395	7.2	7.0	.1	.0	.1
1396	43.6	43.0	.3	.0	.3
1397	19.7	19.7	.0	.0	.0
1398	13.4	13.2	.1	.0	.1
1399	47.1	45.4	.8	.0	.9
1400	42.6	39.1	2.9	.1	.5
1401	44.4	43.5	.6	.0	.3
1402	29.0	28.9	.0	.0	.1
1403	17.1	15.9	.9	.0	.3
1404	34.3	33.8	.2	.0	.3
1405	32.5	31.7	.7	.0	.1
1406	24.3	23.8	.3	.0	.2
1407*	33.4	31.7	1.6	.0	.1
1408*	19.5	18.9	.5	.0	.1
1409*	8.6	7.3	1.0	.0	.3
1410*	23.3	22.8	.2	.0	.3
1411*	32.8	32.0	.6	.0	.2
1412	5.4	5.2	.1	.1	.0
1414	16.4	16.0	.2	.0	.2
1415	13.8	13.6	.1	.0	.1
1416	18.0	2.0	15.4	.0	.6
1417	25.4	10.0	15.1	.0	.3
1418	34.7	33.4	.8	.0	.5
1419	37.4	11.1	25.8	.0	.5
1420	58.1	56.5	.4	.0	1.2
1421	26.1	25.7	.2	.0	.2
1422	11.3	11.2	.1	.0	.0
1423	28.2	27.4	.4	.0	.4
1424	41.3	40.3	.7	.0	.3
1425	46.1	45.2	.5	.0	.4
1426	27.0	25.7	.9	.0	.4
1427	30.7	29.5	.2	.5	.5

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1440	4.1	3.5	0.4	0.0	0.2
1441	27.3	25.8	1.3	.0	.2
1442	31.1	30.1	.8	.0	.2
1443	33.1	31.2	1.6	.0	.3
1444	19.7	3.6	15.4	.0	.7
1445	34.5	33.0	1.0	.0	.5
1446*	29.3	28.2	1.1	.0	.0
1447*	18.9	18.7	.2	.0	.0
1448*	18.9	18.2	.7	.0	.0
1449	15.5	13.4	2.0	.0	.1
1450	17.2	3.6	13.0	.0	.6
1451	29.5	26.6	2.6	.1	.2
1452	22.2	21.3	.2	.4	.3
1453	48.2	46.6	.3	.7	.6
1454	14.2	13.9	.1	.0	.2
1455	25.1	23.7	.2	.8	.4
1456	23.2	22.6	.2	.0	.4
1457	20.7	20.4	.0	.2	.1
1458	31.6	30.6	.5	.0	.5
1459	7.1	7.0	.0	.0	.1
1460*	18.8	2.4	15.7	.0	.7
1461	43.3	41.8	.7	.0	.8
1462	21.1	20.8	.2	.0	.1
1463	28.0	27.4	.3	.0	.3
1465	24.6	17.4	6.6	.1	.5
1466	24.3	23.4	.5	.0	.4
1467	20.2	19.2	.4	.2	.4
1472	25.9	25.3	.3	.0	.3
1473	6.1	6.1	.0	.0	.0
1474	28.9	28.6	.3	.0	.0
1475	40.4	39.2	.6	.0	.6
1476	16.7	16.5	.1	.0	.1
1477	36.0	27.3	8.1	.0	.6
1478	25.7	25.5	.2	.0	.0
1479	37.6	36.7	.4	.0	.5
1480	28.4	27.5	.7	.0	.2
1482	13.3	13.3	.0	.0	.0
1484	21.9	21.9	.0	.0	.0
1485	36.0	33.6	.2	1.7	.5
1486	9.2	1.0	7.9	.3	.0
1487*	17.3	.0	16.9	.0	.4
1488	13.1	1.8	10.9	.0	.4
1489	18.3	1.2	16.2	.5	.4
1490	9.9	9.8	.0	.0	.1
1491	24.5	24.0	.2	.0	.3
1492	44.4	42.8	.1	1.2	.3
1493*	32.2	1.2	30.0	.3	.7

TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1494	24.2	23.2	0.9	0.0	0.1
1495	31.5	30.7	.4	.0	.4
1496	34.8	32.9	.6	.8	.5
1497	9.2	8.2	.8	.0	.2
1498*	10.1	10.1	.0	.0	.0
1499*	13.5	13.5	.0	.0	.0
1500	24.3	24.0	.2	.0	.1
1501*	21.3	21.3	.0	.0	.0
1502	13.8	13.8	.0	.0	.0
1503*	25.1	23.6	1.3	.0	.2
1504	38.1	37.9	.2	.0	.0
1505	15.0	11.7	3.2	.0	.1
1506	34.2	32.3	1.7	.0	.2
1507	9.8	9.2	.4	.0	.2
1508	19.7	19.7	.0	.0	.0
1509	48.0	47.1	.4	.0	.5
1510	16.6	16.2	.3	.0	.1
1511	22.2	17.5	4.5	.0	.2
1512	30.2	29.7	.3	.0	.2
1513	29.8	29.4	.2	.0	.2
1514	28.6	28.1	.3	.0	.2
1515	28.3	28.0	.0	.0	.3
1516	28.2	27.3	.5	.0	.4
1517	27.9	26.4	.6	.0	.9
1518*	17.7	16.3	1.4	.0	.0
1519*	10.7	10.6	.0	.0	.1
1520*	19.1	17.9	1.2	.0	.0
1521	10.1	9.8	.1	.0	.2
1522*	23.1	22.4	.7	.0	.0
1523	23.3	22.3	.4	.0	.6
1524	27.7	26.7	.6	.0	.4
1525	13.4	1.0	12.1	.0	.3
1526	29.6	27.8	1.1	.0	.7
1527	23.6	19.7	3.3	.0	.6
1528	27.5	26.1	.7	.0	.7
1529	25.7	22.8	2.5	.0	.4
1530	23.4	22.6	.0	.0	.8
1531	26.6	24.3	2.1	.0	.2
1532	13.8	1.5	12.1	.0	.2
1533	14.9	.9	14.0	.0	.0
1534*	15.3	15.3	.0	.0	.0
1535*	17.5	16.9	.5	.0	.1
1536*	18.9	18.6	.3	.0	.0
1537	....	....	....	...	...
1538*	16.7	10.9	5.7	.0	.1
1539	43.7	42.8	.7	.0	.2
1540	38.3	35.7	1.9	.0	.7



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1541*	24.4	24.4	0.0	0.0	0.0
1542	22.5	22.3	.0	.0	.2
1543	18.5	18.5	.0	.0	.0
1544	17.3	16.7	.0	.0	.6
1545*	26.1	25.3	.8	.0	.0
1546	37.3	36.1	.4	.0	.8
1547	35.8	34.7	.6	.0	.5
1548	27.5	27.2	.0	.0	.3
1549	23.1	22.4	.3	.0	.4
1550	22.8	22.8	.0	.0	.0
1551	14.3	14.3	.0	.0	.0
1552	15.7	15.7	.0	.0	.0
1553	19.3	19.0	.0	.0	.3
1554	19.0	18.9	.0	.1	.0
1555*	17.0	16.5	.4	.0	.1
1556	29.5	29.5	.0	.0	.0
1557	5.1	5.1	.0	.0	.0
1558	22.9	22.6	.2	.0	.1
1559	16.7	11.6	5.1	.0	.0
1560	9.5	9.1	.4	.0	.0
1561	10.9	10.9	.0	.0	.0
1562	7.1	6.9	.0	.0	.2
1563	39.5	39.2	.3	.0	.0
1564	37.5	36.8	.4	.0	.3
1565	18.6	5.2	13.2	.0	.2
1566	40.6	40.2	.3	.0	.1
1567*	39.2	38.3	.6	.0	.3
1568	49.0	48.4	.3	.0	.3
1569*	39.9	39.3	.4	.0	.2
1570*	28.4	23.5	4.9	.0	.0
1571	18.6	18.5	.0	.0	.1
1572	37.1	36.8	.0	.0	.3
1573	.9	.9	.0	.0	.0
1574	15.1	15.1	.0	.0	.0
1575	25.1	25.1	.0	.0	.0
1576	23.6	23.6	.0	.0	.0
1577	12.8	12.7	.0	.0	.1
1578	22.7	20.5	2.1	.0	.1
1579	....	....	....	...	...
1580*	15.0	14.9	.0	.0	.1
1581	13.9	12.6	1.2	.0	.1
1582	19.1	18.8	.1	.0	.2
1583	10.9	10.9	.0	.0	.0
1584	23.5	23.4	.0	.0	.1
1585	16.1	16.1	.0	.0	.0
1586	22.8	21.7	1.1	.0	.0
1587*	35.3	34.4	.5	.0	.4



TI No.	Total alkaloids (mg/g)	Alkaloid (mg/g)			
		Nicotine	Nor- nicotine	Anabasine	Anatabine
1588	42.0	41.4	0.3	0.0	0.3
1589*	20.4	19.5	.7	.0	.2
1590	20.7	19.8	.6	.0	.3
1591	27.6	26.9	.4	.0	.3
1592	41.6	41.6	.0	.0	.0
1593	21.7	21.5	.2	.0	.0
1594*	14.5	14.5	.0	.0	.0
1595	16.6	16.3	.3	.0	.0
1596	11.8	2.5	9.1	.0	.2
1597	16.2	11.7	4.2	.0	.3
1598	8.3	.4	3.7	4.0	.2
1599*	5.2	4.6	.6	.0	.0
1600*	7.8	7.5	.2	.1	.0
1601*	4.6	4.2	.2	.1	.1
1602	7.2	3.3	3.8	.0	.1
1603	15.7	8.0	7.6	.0	.1
1604	14.0	14.0	.0	.0	.0
1605*	23.3	22.5	.6	.0	.2
1606	4.1	3.7	.4	.0	.0
1607	19.0	17.0	1.8	.0	.2
1608	26.1	18.9	6.9	.0	.3
1609	31.0	29.8	1.2	.0	.0
1610*	17.9	17.8	.1	.0	.0
1611	18.6	16.7	1.5	.0	.4
1612	28.8	28.7	.0	.0	.1
1613	1.0	1.0	.0	.0	.0
1614	15.1	14.5	.6	.0	.0
1615	23.3	23.2	.1	.0	.0
1616	14.4	14.3	.1	.0	.0
1617	31.3	30.9	.2	.0	.2
1618	14.1	14.1	.0	.0	.0
1619	10.0	10.0	.0	.0	.0
1620	1.8	1.8	.0	.0	.0
1621	34.5	33.5	.8	.0	.2
1622	18.5	18.3	.2	.0	.0
1623	6.1	6.1	.0	.0	.0

\* U.S. GOVERNMENT PRINTING OFFICE: 1983-669-038:3

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
SOUTHERN REGION  
P. O. BOX 53326  
NEW ORLEANS, LOUISIANA 70153  

---

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300

POSTAGE AND FEES PAID  
U. S. DEPARTMENT OF  
AGRICULTURE  
AGR 101



FIRST CLASS